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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,090	10/23/2001	Michael Kowalchik	EMR-00301	9342
47653	7590	12/23/2004	EXAMINER	
DAVID E. HUANG, ESQ.			CHACE, CHRISTIAN	
CHAPIN & HUANG, L.L.C.				
WESTBOROUGH OFFICE PARK			ART UNIT	PAPER NUMBER
1700 WEST PARK DRIVE			2187	
WESTBOROUGH, MA 01581				
				DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/004,090	KOWALCHIK ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Christian P. Chace	2187	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 29 November 2004.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-9, 12-20 and 22-27 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-9, 12-20 and 22-27 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 23 October 2001 is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
     Paper No(s)/Mail Date 7/26/04.

- 4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 November 2004 has been entered.

### ***Information Disclosure Statement***

IDS submitted 27 July 2004, after the ailing of the previous Office action, was not accompanied by a fee and statement under 37 CFR 1.97(e). Accordingly, the IDS has not been considered, and a "lined through" copy is attached hereto.

### ***Response to Amendment***

Amendment filed 29 October 2004, 26 November 2004, and 2 December 2004 has been entered upon filing an RCE. Examiner wishes to note that an advisory action was sent in response to the 29 October 2004 filing of the instant amendment as an after-final submission. Claims 1-9, 12-20, ad 22-27 are pending. Claims 10-11, 21, and 28-29 are canceled. Applicants' arguments have been carefully and respectfully considered, but they are not persuasive in light of the instant amendment, and have been addressed in the advisory action mailed 2 December 2004, as well as herein. As this is a first action on merit following an RCE, this action has NOT been made final.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 12-20, and 22-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Brant et al (US Patent #5,805,787).

With respect to independent claim 1, a data storage device is disclosed in figure 1, #16.

More than two disk drives are disclosed in figure 1 as #22. Those disk drives having platter sizes less than 3.5 inches in diameter is disclosed in column 3, lines 44-46.

A controller that accesses the disk drives in response to received I/O requests (column 5, line 35, for example) is disclosed in figure 1 as #20, and it's operation is further discussed in column 6, line 35, for example. I/O is merely the tasks of gathering data for a computer or program to work with, and making the results of the computer's activities known to the user or other processes. Gathering is usually performed by input devices such as keyboard, mouse, and/or disk drives, while the output is usually made available to the user via the display and the printer and via the disk files or communications ports for the computer.

The controller "simultaneously performing at least a part of at least two write operations onto said more than two disk drives in response to at least two different write

requests is disclosed in column 1, lines 44-45 as “servicing [two different write] requests in parallel,” in column 2, lines 55-56 as, “A given controller can concurrently service a plurality of data recovery operations,” and in column 5, lines 29-31 as, “A storage subsystem that has the MB cost of disk coupled with the performance of many disks operated in parallel can fill several intermediate slots in this hierarchy.”

The controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, “Redundant Array of Independent Disks.” In this case, column 5, line 59 recites “Controller 20 can include independent paths to write data to its memory in a mirrored fashion.” Mirroring is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to claims 2 and 25, a device interface to receive I/O requests is disclosed in figure 1, #16.

The device interface comprising an interface configured to conform to a protocol is disclosed in column 6, lines 39-44, where the protocol is "SCSI-type connections."

With respect to claims 3 and 26, the protocol comprising at least one of the following: SCSI, Fibre Channel, and "Infiniband" is disclosed in column 6, lines 39-44, which specifically discloses SCSI.

With respect to claims 4 and 27, the platter sizes comprising at least one of the following platter sizes: 2.5 inches, 1.8 inches, and 1 inch in diameter is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claims 5, 17, and 23, at least one of the disk drives comprising an IDE drive is disclosed in column 6, lines 22-24.

With respect to claims 6 and 22, the more than two disk drives having platter sizes less than 3.5 inches in diameter comprising more than two disk drives having platter sizes 2.5 inches or less in diameter is disclosed in column 3, lines 44-46, which not only discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter as well.

With respect to claim 7, the more than two disk drives having platter sizes less than 3.5 inches in diameter comprising more than two disk drives having platter sizes one inch in diameter or less is disclosed in column 3, lines 44-46, which not only

discloses the 1.8 inch diameter disk, but also states that "(or smaller)" [would work in the invention]. "Or smaller" would include the 1 inch diameter and smaller as well.

With respect to claim 12, the RAID data comprising at least one of a stripe, an error detection code, and an error correction code, is disclosed in column 3, lines 11-12 and 19-20, where reconstruction based on parity is error correction, and parity comparisons are error detection. Striping is used in RAID applications, which are discussed in column 5, lines 34, 36, and 44, for example.

With respect to claim 13, the data storage device performing cache operations, said data storage device further comprising a cache manager is disclosed in figure 1 as #20, and its operation is further discussed in column 6, line 35, for example.

With respect to claim 14, the cache manager comprising a manager configured to perform at least one of the following: translate an address of a different storage device (for example, back-end storage), cache data included in a write request, load data from the different storage device, and remove cached data is disclosed in column 6, line 35, for example. The controller #20 in Brant et al performs the functions of the instantly claimed cache manager as well as the instantly claimed controller of instant claim 1.

However, it happens that all of the following are anticipated by the cited prior art of record, with the instant claim limitations in parenthesis along with the relevant citation in Brant et al:

Requesting data from a back-end storage system (which inherently requires translating the address of that different storage system) (see column 6, lines 50-51);

Retrieving requested data (caching data included in a write request and loading data from the different storage device) from the [at least two] disks [making up the cache] (see column 4, lines 9-19);

Sending data to the back-end system for writing (column 6, lines 50-51);

Determining the location of back-end system data (more address translation) within the [at least two] disks [making up the cache] (column 4, lines 32-48).

Removing data from the [at least two] disks [making up the cache] (removing cached data) (column 4, lines 42-44).

With respect to claim 15, a controller card that includes the controller and connections available to couple with more than one storage card that provides access to the [a] the [at] least two of the [disk] drives is disclosed in column 5, lines 41-45, which discloses ASIC based daughter cards which the disclosed products of Brant et al can be based on. These products of Brant et al are what examiner is rejecting the instant claims over, so it logically follows that "these products" apply to the instant claim language.

With respect to claim 16, the storage card comprising a card having at least one parallel interface to a collection of the drives is disclosed column 5, line 30 as well as lines 41-45, for the reasons as discussed supra with respect to claim 15.

With respect to claim 18, the connection between the controller and storage card comprising a serial connection is disclosed in column 6, line 41, as "SCSI-type connections." SCSI has a serial as well as a parallel "type" connection, and, therefore, the cited passage anticipates the instant claim language.

With respect to claim 19, the controller comprising a bank interface that routes data requests to the appropriate bank of drives is disclosed in figure 1 as #15, as discussed in column 5, lines 54-56, for example.

With respect to independent claim 20, a data storage system is disclosed in figure 1.

At least one first data storage device is disclosed in figure 1 as #25. The storage device having a platter size of at least 3.5 inches in diameter is disclosed in column 5, line 39. The hierarchy listed in column 5, from line 12 to line 28, shows the lower levels of the hierarchy having higher capacity disks. To increase capacity on a disk that uses a standard method of data storage, one must, inherently, increase the physical size, or platter size, of that disk.

At least one second data storage device is disclosed in figure 1 as #16.

A device interface for receiving I/O requests (see claim 1 supra) is disclosed in figure 1 as #11.

A first controller configured to receive I/O requests from the [device] interface is disclosed in figure 1 as #20.

More than two disk drives coupled to the controller are disclosed in figure 1 as #22, coupled by #15. The disk drives having platter sizes less than 3.5 inches in diameter is disclosed in column 3, line 45, for example.

The controller "simultaneously performing at least a part of at least two write operations onto said more than two disk drives in response to at least two different write requests is disclosed in column 1, lines 44-45 as "servicing [two different write] requests

in parallel," in column 2, lines 55-56 as, "A given controller can concurrently service a plurality of data recovery operations," and in column 5, lines 29-31 as, "A storage subsystem that has the MB cost of disk coupled with the performance of many disks operated in parallel can fill several intermediate slots in this hierarchy."

A second controller that coordinates access to the at least one first storage device and the at least one second storage device is disclosed in figure 1 as #24.

The controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, "Redundant Array of Independent Disks." In this case, column 5, line 59 recites "Controller 20 can include independent paths to write data to its memory in a mirrored fashion." Mirroring is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

With respect to independent claim 24, a method of servicing data access requests at a data storage device is disclosed in column 2, lines 46-53, for example.

Receiving data access requests at a device interface is discussed in column 6, lines 39-44, for example. The host sends and receives data through interface #11 in figure 1.

Accessing more than two disk drives (figure 1, #22) having platter sizes less than 3.5 inches in diameter (column 3, line 45) in response to the received data access requests is disclosed in column 6, lines 39-48.

“Simultaneously performing at least a part of at least two write operations onto said more than two disk drives in response to at least two different write requests is disclosed in column 1, lines 44-45 as “servicing [two different write] requests in parallel,” in column 2, lines 55-56 as, “A given controller can concurrently service a plurality of data recovery operations,” and in column 5, lines 29-31 as, “A storage subsystem that has the MB cost of disk coupled with the performance of many disks operated in parallel can fill several intermediate slots in this hierarchy.”

The controller comprising a controller configured to implement or access the more than two disks in, a RAID scheme is disclosed in column 5, lines 34, 36, and 44, in general. RAID stands for, “Redundant Array of Independent Disks.” In this case, column 5, line 59 recites “Controller 20 can include independent paths to write data to its memory in a mirrored fashion.” Mirroring is redundant storage of data. The cache being an array is disclosed in column 4, line 15, for example. Figure 1 clearly shows

separate disks, and, therefore, independent disks. Therefore, RAID is explicitly disclosed embodied in the invention of Brant et al.

The scheme implemented by the controller comprising a RAID scheme is disclosed as discussed supra with respect to instant claims 10, 21, and 28. The RAID scheme being independent of a hierarchically higher RAID controller that sends the data storage device data is discussed in column 5, lines 12-35. By stating that the system of Brant et al, which includes RAID, as discussed in the cited passage, that the storage subsystem can fill **several** intermediate slots in the hierarchy, as stated in line 31 of the instant passage, Brant et al anticipates hierarchically higher RAID controllers.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brant et al as applied to claim 1, upon which the instant claims depend, above, and further in view of Eckerd et al (US Patent #6,078,498).

Brant et al teaches the data storage device as claimed in claim 1 of the instant application, and also teaches smaller form factor disk drives in column 1, line 42, for example.

The difference between Brant et al and the instant claims are the explicit recitations of a housing, the housing having one of the following form factors: standard, half-height, and low-profile.

However, Eckerd et al disclose a top cover cooperating with the base deck to form an internal, sealed environment for the disc drive in column 3, lines 22-25. This is a housing. In column 6, lines 18-30, Eckerd et al disclose that housing to be a standardized form factor, including low profile, nominal, and half-height.

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, having the teachings of Brant et al and Eckerd et al before him/her, to utilize the housing and form factors of Eckerd et al in the invention of Brant et al, because smaller form factor disk drives permit disk subsystems to exploit performance advantages of having more disks to service requests in parallel, as discussed by Brant et al in column 1, lines 42-45, and because the relative configurations of the mounting plate and chassis can vary depending upon requirements of a given application, as discussed in column 5, lines 15-18 of Eckerd et al.

### ***Response to Arguments***

With respect to applicants' arguments, examiner finds that they have been addressed supra with respect to the claim rejections, as well as in the advisory action, also discussed supra, and repeated herein for convenience:

As to applicants' arguments with respect to the rejections of the claims (1-7 and 10-29 under 35 USC 102 and 8-9 under 35 USC 103), specifically that the cited prior art does not anticipate the claim language, even as amended, examiner respectfully disagrees. Applicants have included the subject matter of claims 10-11 into claim 1, 11 and 21 into claim 20, and 28 and 29 into claim 24, and then canceled claims 10-11, 21, and 28-29.

Applicants continue by traversing the rejection of former claim 11, now incorporated into claim 1, by arguing that Brant et al do not teach a data storage device having a controller configured to implement a RAID scheme that is independent of a hierarchically higher RAID controller that sends the data storage device RAID data. Examiner respectfully disagrees, and refers applicants to the final rejection of claim 11 in the previous Office action. It is noted that with respect to the other independent claims, applicants rely on this argument with respect to claim 1 as well.

In column 5, lines 30-40, Brant et al recite, "Further down the hierarchy, inexpensive controllers coupled to an array in RAID1 configurations can yield high I/O rates. Still further down the hierarchy, RAID5 configurations reduce the cost of protected storage with small redundancy groups and higher capacity disk." In column 6, lines 29-31, Brant et al recite, "Conversely, an entirely separate high capacity data storage device can independently provide the subsystem 25 functions." Column 6 continues by reciting, in lines 51-53, that, "Typically, subsystem 25 includes its own controller to handle data exchanges coordinated with controller 20" (RAID cache controller). Clearly, Brant et al teach the instant claim language.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christian P. Chace whose telephone number is 571.272.4190. The examiner can normally be reached on MAXI FLEX.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald Sparks can be reached on 571.272.4201. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Christian P. Chace  
Examiner  
Art Unit 2187